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2CAN061401

**10CFR 50.73**

June 2, 2014

U. S. Nuclear Regulatory Commission  
Attn: Document Control Desk  
Washington, DC 20555-0001

Subject: Licensee Event Report 50-368/2014-002-00  
Automatic Reactor Trip and Emergency Feedwater Actuation  
Arkansas Nuclear One – Unit 2  
Docket No. 50-368  
License No. NFP-6

Dear Sir or Madam:

Pursuant to the reporting requirements of 10CFR 50.73, attached is the subject Licensee Event Report concerning an automatic reactor and main generator trip on April 3, 2014, with a subsequent emergency feedwater actuation and start of an emergency diesel generator.

There are no new commitments contained in this submittal. Should you have any questions concerning this issue, please contact Stephenie Pyle, Manager, Regulatory Assurance at 479-858-4704.

Sincerely,

***Original Signed by Jeremy G. Browning***

JGB/car

Attachment: Licensee Event Report 50-368/2014-002-00

cc: Mr. Marc L. Dapas  
Regional Administrator  
U. S. Nuclear Regulatory Commission  
Region IV  
1600 East Lamar Boulevard  
Arlington, TX 76011-4511

NRC Senior Resident Inspector  
Arkansas Nuclear One  
P.O. Box 310  
London, AR 72847

Institute of Nuclear Power Operations  
700 Galleria Parkway  
Atlanta, GA 30339-5957  
[LEREvents@inpo.org](mailto:LEREvents@inpo.org)

**LICENSEE EVENT REPORT (LER)**

(See reverse for required number of digits/characters for each block)

Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the FOIA/Privacy Section (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to [infocollects.resource@nrc.gov](mailto:infocollects.resource@nrc.gov), and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

<b>1. FACILITY NAME</b> Arkansas Nuclear One – Unit 2	<b>2. DOCKET NUMBER</b> 05000368	<b>3. PAGE</b> 1 OF 4
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**4. TITLE** Automatic Reactor and Main Generator trip with a subsequent Emergency Feedwater actuation and start of an Emergency Diesel Generator.

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
04	03	2014	2014 – 002 – 00			06	02	2014	FACILITY NAME	DOCKET NUMBER

<b>9. OPERATING MODE</b> 1	<b>11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)</b>									
	<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2203(a)(3)(i)	<input type="checkbox"/> 50.73(a)(2)(i)(C)	<input type="checkbox"/> 50.73(a)(2)(vii)						
<b>10. POWER LEVEL</b> 100	<input type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)						
	<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 20.2203(a)(4)	<input type="checkbox"/> 50.73(a)(2)(ii)(B)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)						
	<input type="checkbox"/> 20.2203(a)(2)(i)	<input type="checkbox"/> 50.36(c)(1)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(ix)(A)						
	<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 50.36(c)(1)(ii)(A)	<input checked="" type="checkbox"/> 50.73(a)(2)(iv)(A)	<input type="checkbox"/> 50.73(a)(2)(x)						
	<input type="checkbox"/> 20.2203(a)(2)(iii)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(v)(A)	<input type="checkbox"/> 73.71(a)(4)						
	<input type="checkbox"/> 20.2203(a)(2)(iv)	<input type="checkbox"/> 50.46(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(v)(B)	<input type="checkbox"/> 73.71(a)(5)						
	<input type="checkbox"/> 20.2203(a)(2)(v)	<input type="checkbox"/> 50.73(a)(2)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(v)(C)	<input type="checkbox"/> OTHER						
	<input type="checkbox"/> 20.2203(a)(2)(vi)	<input type="checkbox"/> 50.73(a)(2)(i)(B)	<input type="checkbox"/> 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A						

12. LICENSEE CONTACT FOR THIS LER	
FACILITY NAME Stephenie L. Pyle, Manager, Regulatory Assurance	TELEPHONE NUMBER (Include Area Code) 479-858-4704

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT									
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
C	FK	N/A	N/A	Y					

<b>14. SUPPLEMENTAL REPORT EXPECTED</b>				<b>15. EXPECTED SUBMISSION DATE</b>		
<input type="checkbox"/> YES (If yes, complete 15. EXPECTED SUBMISSION DATE) <input checked="" type="checkbox"/> NO				MONTH	DAY	YEAR
				N/A	N/A	N/A

**ABSTRACT** (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)

On April 3, 2014, at approximately 1300 CST, Arkansas Nuclear One Unit 2 (ANO-2) tripped from 100% power due to a fault in 161kV Russellville East Line. The fault caused a momentary degraded voltage state on the 161kV and 500kV grid at ANO and an undervoltage condition for ANO-2 Startup #3 Transformer (SU3). This under voltage condition caused SU3 undervoltage relays to initiate a fast transfer of ANO-2 4160V bus (2A-1) and 6900V bus (2H-1), to Startup Transformer #2 (SU2). Buses ANO-2 6900V (2H-2) and 4160V (2A-2) were not allowed to fast transfer to SU2 because of operational restraints per design. The removal of power to 2A-2 caused an auto start of the ANO-2 Emergency Diesel Generator (2K-4B) due to under voltage on safety bus 2A-4 which is normally fed from 2A-2. Bus 2A-2 slow transferred back to SU3. 2K-4B did not tie to 4160V safety bus (2A-4) as voltage had recovered prior to the diesel reaching rated speed and voltage. Bus 2H-2 was de-energized causing the loss of two Reactor Coolant Pumps (RCPs) which led to a reactor trip on low RCP speed and the actuation of the Emergency Feedwater System (EFW) on low Steam Generator Level. It was determined that a lightning strike caused a three phase fault on the 161kV Russellville East Line causing the ANO-2 trip. The corrective action is for Entergy Arkansas to review the adequacy of 161kV Russellville East Transmission Line Lightning Protection System.

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**NARRATIVE**

**A. Plant Status**

At the time of the subject event, ANO-2 was at approximately 100% power. All structures, systems, and components that were needed to mitigate, reduce the consequences of, or limit the safety implications of the event were available. At the time of the event, a Tornado Watch was in effect.

**B. Event Description**

On April 3, 2014, at approximately 1300 CST, ANO-2 tripped from 100% power. This event was preceded by a three phase fault on the Russellville East 161kV, causing the 161kV line breakers to trip and isolate the fault. The fault caused a momentary degraded voltage state on the 161kV and 500kV grid at ANO and an undervoltage condition for ANO-2 Startup #3 Transformer (SU3) [FK][XFMR]. The 161kV switchyard voltage dropped to approximately 57 kV and the 500kV switchyard voltage dropped to approximately 389kV, resulting in the input voltage to SU3 to degrade and lower SU3 output voltages. Based on the degraded voltage, the undervoltage relays actuated to fast transfer ANO-2 4160V bus (2A-1) [EB] and ANO-2 6900V Bus (2H-1) [EA], to Startup # 2 Transformer (SU2) [FK][XFMR]. SU2 was in pull to lock for ANO-2 4160V bus (2A-2) [EB] and 6900V bus (2H-2) [EA] according to procedural requirements for the selected operation alignment. This condition resulted in a low voltage condition for 2A-2, and a start of the ANO-2 Emergency Diesel Generator (2K-4B) [DG] due to a low voltage on the ANO-2 4160V safety bus (2A-4) [EB] which is supplied from 2A-2. Before 2A-4 tied on to the diesel 2A-2 slow transferred back to SU3 causing a load shed of all motors on 2A-2. Bus 2H-2 was de-energized causing the loss of two Reactor Coolant Pumps (RCPs) [P] which resulted in a reactor trip on low RCP speed. The Emergency Feedwater System (EFW) [BA] actuated post trip on low Steam Generator [SB] Level. 2K-4B did not tie to 2A-4 as voltage had recovered on 2A-2 prior to the diesel reaching rated speed and voltage. It was determined a lightning strike had occurred near the plant which caused the 161 kV and the 500kV switchyard voltage drop. The 161kV Russellville East Transmission Line feeder breakers tripped to isolate the fault and were subsequently reclosed.

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**C. Apparent Causes**

The direct cause for the ANO-2 was determined to be a lighting strike which caused a three phase fault on the 161kV Russellville East Line. This lighting strike disrupted power from the 161kV Russellville East Transmission Line and degraded the grid voltage to the 161kV and 500kV grid voltage in the switchyard.

**D. Corrective Actions**

Entergy Arkansas will be reviewing the adequacy of 161kV Russellville East Transmission Line Lightning Protection System. Additional site data is being compiled and will be provided to assist Entergy Arkansas review of the Lighting Protection System.

**E. Safety Significance**

Systems and components required to shutdown the reactor, maintain safe shutdown conditions, remove residual heat, and control the release of radioactive material were available and performed as required. There were no actual consequences related to the subject event with regards to nuclear safety.

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**F. Basis For Reportability**

This event is reported pursuant to the 10 CFR 50.73(a)(2)(iv)(A): "Any event or condition that resulted in manual or automatic actuation of any of the systems listed in paragraph (a)(2)(iv)(B)

Applicable systems in 10 CFR 50.73(a)(2)(iv)(B):

“Reactor protection system (RPS) including: reactor scram or reactor trip” and

“PWR auxiliary or emergency feedwater system.”

**G. Additional Information**

10 CFR 50.73(b)(5) states that this report shall contain reference to “any previous similar events at the same plant that are known to the licensee.” NUREG-1022, Revision 3 reporting guidance states that the term "previous occurrences" should include previous events or conditions that involved the same underlying concern or reason as this event, such as the same root cause, failure, or sequence of events.

A review of the ANO corrective action program and Licensee Event Reports for the previous three years revealed one relevant similar event that was not reportable. On July 10, 2013, a lightning strike induced a three phase fault on the 161kV Russellville East Transmission Line; however, this event did not result in a reactor trip.

Energy Industry Identification System (EIIS) codes and component codes are identified in the text of this report as [XX].